RELEASE 1.0

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EVOLVING COMMERCE

by Jerry Michalski

What's holding up electronic commerce? Sure, commercial sites are sprouting like weeds on the Internet. Amazon.com, Cisco and Dell aren't the only companies that are raking in Net revenues; many others are making far more than they imagined. E-commerce seems to be thriving, but it also seems to be stuck far from the friction-free ideal that the term promises. There is a lot going on, but most of the efforts are headed in different directions. The market is frenzied, chaotic and full of friction. Why?

Only three years ago, "electronic commerce" was practically synonymous with Electronic Data Interchange (EDI), a field that over the past 20 years has transformed many industries, eliminating considerable paperwork and cost as it reconfigured business relationships. But EDI got stuck serving prearranged, repetitive, high-volume transactions between businesses in the specific industries that had moved to create and adopt EDI standards (see **Release 1.0**, 11-92).

Although useful, EDI was also inflexible, complex and expensive to implement. It often took industries by force: A central buyer such as the US Department of Defense, Sears or Ford Motors would mandate its use and excommunicate non-conforming suppliers. New EDI standards were slow to emerge and painful to create. They required agreements between competitors working through national and international standards bodies such as ANSI and EDIFACT. Tensions between the desire for progress and the desire to preserve competitive advantages kept standards from developing rapidly.

Then the Internet hit the scene, and myriad Internet-based e-commerce initiatives joined the fray. They came in all flavors and sizes, from micropayment systems and new digital currencies to electronic storefronts, catalogs and cybermalls powered by beefy, proprietary commerce engines capable of delivering dynamic views to all visitors (see **Release 1.0**, 1-95). Several patterns emerged from the fray.

Not much order out of chaos

Many EDI vendors realized quickly that secure and reliable Internet connections could save their clients much of the money they were paying private value-added networks. But other aspects of Net-based electronic commerce eluded EDI, which was ill-suited to the ad-hoc, often small and infinitely customizable transactions of cyberspace. ⟹

CONGRATULATIONS, ESTHER!

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Names, phones, dates, URLs.

Seeing a big opportunity, a number of startups jumped into the market with commerce engines that emphasized secure transactions, speedy database access or sophisticated customer tracking, but they were essentially back-office systems for storefronts or catalogs that individual customers still had to visit, interpret and act on.

As merchant sites proliferated and matured, buyers and sellers realized how inert Web pages are, even when they are dynamically generated. Today, Web pages are created to be interpreted by human eyes and brains; they're hard to automate or put to work. If you see a table of data on the Web, it's not easy to copy and paste it into a spreadsheet, much less import it into a database and do something with it. Ironically, in many cases data moves from structured stores to the structure-free Web, where someone else then has to go through the effort of structuring the data all over again.

Recent startups such as OnDisplay and Netbot (both of which debuted at the 1997 PC Forum; see **Release 1.0**, 3-97) have built their businesses based on the Web's semantic shortcomings. OnDisplay lets programmers define specific fields to track on other companies' Websites and integrate the data into custom Web pages for internal use, creating competitive pricing analyses, comparative interest-rate tables, personal ski reports and so on. Netbot uses a "wrapper" language to give its bots (software agents) access to merchants' Websites. These bots can then automate comparison-shopping for people looking for items such as audio CDs or motorcycles.

OnDisplay and Netbot assume that their information sources are unenhanced and uncooperative -- though not hostile. What if those companies decided to help? What if tables declared that their contents were ordered by SKU, price and quantity? Two World Wide Web Consortium (W3C) projects offer ways to define such data for Websites. The first is the Metadata initiative, which specifies ways for Web developers to embed descriptive information in Web pages but doesn't offer consistent semantic guidelines.

The second is XML (the eXtensible Markup Language), which is the apparent future of HTML. XML blends the semantic and structural power of SGML with the pragmatism of HTML. XML Document Type Definitions (DTDs) contain useful information about page contents. The problem is that companies will define things their own way, losing much of the potential for interoperability. A unified vocabulary would be useful. Hold that thought.

Note that the market-makers we covered the past two months are all manual. That is, individual buyers and sellers have to visit the sites to transact. Buyers might set keyword triggers to alert them when something they want is available (e.g., Classifieds2000 will happily tell you when a large-format camera is available for under $400; FastParts sends e-mail notices to members whose lots are affected by new bids), but they have to return to the sites to consummate their transactions.

Open is as open does

Meanwhile, the major technology vendors -- Sun, Microsoft, IBM, Netscape -- have all issued "open" e-commerce architecture statements. These and other vendors have collaborated on various initiatives, such as secure electronic payments and identity-management systems, yet the only things that most of the offerings have in common is that they use the basic Internet protocols. Some even modify these protocols in ways that make them incompatible.

Predicting the need to organize these early Internet electronic-commerce initiatives, representatives from a handful of Silicon Valley organizations got together in 1994 to form CommerceNet. After an initial flurry of excitement, CommerceNet's members formed committees and disappeared into meetings. For a while, it seemed to outsiders that CommerceNet might get stuck with the dynamics of the EDI world.

A new eCo system

Last May, *IEEE Computer* magazine published an article by CommerceNet founder Marty Tenenbaum and two colleagues which outlined ambitious plans for a scalable, object-oriented framework of frameworks for electronic commerce that they referred to as the eCo (eCommerce) system. (We use a small "s" in "system" because "eCo system" is not a product name nor a service mark. It is an architectural approach and the internal code name for the set of projects.)

In order to create some of the technologies needed for the eCo system -- and capitalize on being first to market with them -- Tenenbaum started the for-profit CNgroup and joined forces with two other recent startups: Tesserae Information Systems and BusinessBots. This issue of **Release 1.0** focuses on the organizations collaborating to develop the eCo system.

This month, the eCo group received a $5 million grant to create an open, component-based architecture for Internet commerce from the US Department of Commerce's Advanced Technology Program (ATP). The ATP grant is a useful source of non-diluting seed capital for the eCo system.

CNGROUP AND THE ECO SYSTEM

The eCo system is designed to encompass a wide variety of sources and servers, from Websites to transactional applications. It wraps around them loosely, like vines. If companies choose to enhance their Websites with the eCo services we will describe shortly, they will be able to participate in new forms of automated commerce. If they don't, the eCo system provides ways to wrap and enhance the sites so they are still useful participants. Clearly, CommerceNet's members were not asleep.

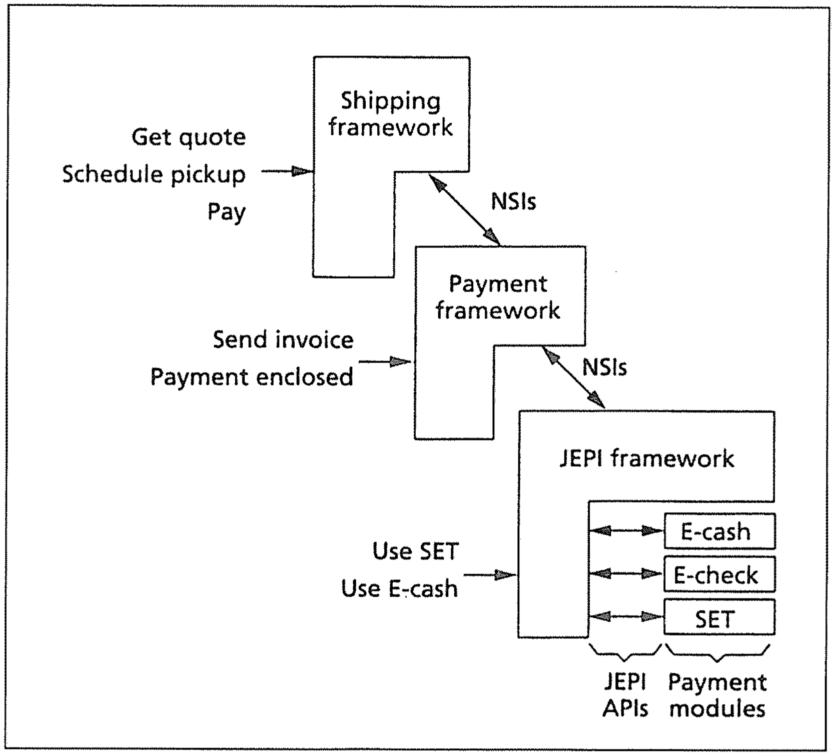
Components in eCo system can represent entities, processes and services that in turn map to real applications, markets and business processes. The system's creators want to foster a variety of components for commerce that non-programmers can assemble as needed. Need an order shipped? An eCo shipping component will contain all the variables needed to interoperate with any shipper. Need an invoice? Those standards will exist, too.

The eCo group's Holy Grail is to allow business developers to assemble businesses arbitrarily from layers of functional business components, potentially outsourcing any element of their businesses. Virtual companies might come into being as entrepreneurs assemble these components into unique propositions, perhaps performing only one of the tasks in the value chain, such as merchandising. Transaction processing, collections and fulfillment might all be subcontracted to other companies in the eCo system, with data flowing between the companies easily.

Despite all the talk about object-oriented componentry that can do practically anything, this is not a Jihad or Crusade for the eCo companies. They know that it is practically impossible to get every company to agree on standards and taxonomies of terms, so they are building a complex system from simple, flexible components such as XML.

Covering everything

The diagram below illustrates nicely the nested frameworks that comprise the eCo system. It shows how a computer purchase transaction might invoke shipping, payment and secure-transaction frameworks. Framework interactions are defined by Network Service Interfaces (NSIs; JEPI is the Joint Electronic Payment Initiative).



All objects in eCo can talk to each other through a common object bus. They make requests of each other using the Common Business Language (CBL). CBL primitives, which include market actions such as buy, sell, bid and ask, operate consistently at many levels. They can drive an application, a business, a virtual business, a market or a market intermediary such as a broker or aggregator.

Using those primitives, eCo system developers will create more complex market models, including:

- **Matchmaking** systems automatically match buyers and sellers based on product descriptions and profiles of the parties involved;
- **Negotiation** systems allow buyers and sellers to post criteria, get notifications and modify their offers;
- **Buy-sell brokering** systems accept requests for quotations, which they forward to registered sellers;

- **Referrals and directories** provide prospective buyers with lists of sellers who meet their criteria; and
- **Aggregators** collect requests for goods and services from multiple buyers, then pool them to get quantity discounts from sellers.

Several more elements complete the eCo architecture. Distributed registry services log and locate things. A registry infrastructure playfully called the Taxonomy of Everything provides a way to unify taxonomies from different sources by defining and mapping their elements and functions. All eCo-enabled components can be driven by software agents. Finally, the eCo system will include object wrappers for legacy (eCo-unaware) Websites.

Aggressive interoperability

One of EDI's weaknesses is that its protocols hard-code everything. The eCo system is more forgiving. By using object-oriented frameworks with inheritance and intelligence, the eCo framework can deal with novel situations. Instead of insisting on standards, it defines meta-protocols that allow for negotiation between multiple standards, including EDI.

ECo components can communicate over the Web using HTTP or make CORBA calls over IIOP (the Internet Inter-ORB protocol) -- both over IP. The eCo system

Earlier efforts

Aspects of the eCo system echo the efforts of two ill-fated companies: Taligent and General Magic. Taligent, an IBM/Apple joint venture, tried to write all the object frameworks itself. Not only was this a gargantuan task, it was also unlikely that all industries and players would happily embrace Taligent's standards and start using them. The company has since closed down.

General Magic created a different proprietary framework with a remote-agent architecture that limited its functionality. In the interests of security, Telescript's designers created a system that sent smart agents off to agent servers, where they would interact and do business on behalf of their owners. Just when online services and the Internet were warming up, offering highly interactive browsing and shopping experiences, General Magic devices had no concept of an online session. The services were all back-end.

The company was well capitalized and over the past two years has completely repositioned itself away from commerce and into integrated communications. Odyssey is the name of General Magic's new, Java-based, CORBA-compliant infrastructure. It is the foundation of the company's soon-to-be-available integrated-messaging platform called Serengeti.

It is unlikely that the eCo group will replicate these mistakes. Its architecture and process are open, decentralized and far more tolerant of legacy applications and uncooperative components. It doesn't depend on any single technology. For example, agents are one of many ways of building applications in the eCo system.

also supports bridging gateways and mediators (smart gateways). The system is designed for a variety of transport, payment and security protocols; it allows for swapping to accommodate each situation. Tenenbaum refers to this as "aggressive interoperability."

That's the principle that the eCo group is using to tackle security and payment systems, which are hefty problems themselves. For example, several proprietary and incompatible systems are available already. CommerceNet and the World Wide Web Consortium (W3C) decided to address payments by creating a framework that encompasses as many payment systems as possible, so they formed the Joint Electronic Payment Initiative (JEPI).

Process is key

Although the eCo group's architectural framework is its most visible goal, its process and organizational structure may be more important. If its implementation lives up to its promise, eCo may well affect pricing models, cost structures and industry dynamics. It may make room for aggregators, brokers and other added-value services in industries where there was no room before. Companies may be able to serve specialized communities they couldn't reach before.

The eCo system project will coordinate its efforts with major vendors' e-commerce initiatives: Netscape's **Open Network Environment**, Sun/Javasoft's **Java Electronic Commerce Framework**, Microsoft's **Internet Commerce Framework** and Oracle's **Network Computing Architecture**. The group has promised to interoperate with frameworks that may come out of other initiatives, including the Internet Purchasing Roundtable's **Open Buying on the Internet**, the Object Management Group's **Common Business Objects** and Microsoft's **Value Chain Initiative**.

The eCo group will create a Virtual Testing Laboratory in which participating companies can test their components for performance and interoperability. It will also certify companies' compliance with eCo's structures and policies.

CommerceNet will help bring competitors together to hash out the abstract core functions that their industry's systems should support in CBL. For each framework, eCo will establish a core team of three to five domain experts. From there, the circles of inclusion expand. The next circle out is developers, who want to implement products based on the frameworks. Then come testbed participants, who want to put the products to work and industry observers, who track the process and offer feedback.

Of course, standards, data formats and interfaces have long been the sources of competitive advantage. Given that many companies have already established online markets in different industries (e.g., InsWeb, Intuit's InsureMarket and the World Insurance Network; Classifieds2000, Electronic Classifieds and AdOne; Amazon.com and Barnes & Noble), what will motivate them to join the eCo effort?

Matrix management

The eCo project has vertical and horizontal elements that map to industry applications and infrastructure layers. It is relatively obvious which horizontal layers developers should start with: critical functions such as security and payment systems.

Choosing vertical markets to focus on is trickier, since market dynamics will largely dictate whether eCo thrives. Promising early markets include online retail sales, computers, financial services, procurement networks, publishing and aerospace. Developers want to move quickly and get some early wins. They have already begun a retail project and hope to have several iMarkets up and running in six months.

CNgroup itself

Marty Tenenbaum, CommerceNet's founder and chairman, also founded and chairs CNgroup, a CommerceNet spinout that plays the roles of lead architect, prime contractor, core developer and process consultant in the eCo constellation. CNgroup also coordinates and integrates the other companies' efforts. Its president and ceo is Asim Abdullah, formerly of Taligent, IBM and Rolm.

CNgroup expects to be first to market with some of the technologies needed to make eCo a reality, such as business objects, class libraries, servers, software development kits, registries and application development tools. CNgroup may end up operating markets, making money from transactions, acting as an intermediary for buyers and sellers, or leading development projects.

Tenenbaum has a long and interesting history in the Valley. In 1991, he co-founded Enterprise Integration Technologies (EIT), a consultancy full of sharp programmers and with a knack for having its fingers in the right places. Before Jim Clark lured Marc Andreessen to Mosaic Communications (now Netscape), Andreessen spent a brief time at EIT. Tom Gruber, now president of Intraspect, was at EIT when he developed a popular Lisp hack called HyperMail. Kevin Hughes, another EIT employee, converted HyperMail to C and has since moved with Tenenbaum to CNgroup. In 1996, VeriFone bought EIT.

TESSERAE: A BABELFISH FOR NET DATA

In early 1996, after many years of information integration projects in the computer science department at Stanford University, research associates Narinder Singh and Don Geddis decided to put their knowledge to work in a for-profit venture of their own. After all, startups were sprouting weekly and going public at amazing multiples of feeble revenue streams; shouldn't they partake, too?

That June, Singh and Geddis founded Tesserae Information Systems, which uses knowledge-sharing technology from the world of artificial intelligence to integrate diverse information resources on the Net. Ordinary workers (read: non-programmers) can use the Tesserae system to run queries that may require data that lives in many different systems. Tesserae normalizes the data elements and connects known elements to find the missing pieces. It may even have to carry out a sequence of sub-queries.

Acronymland

Tesserae's *lingua franca* is the Agent Communication Language (ACL). All the information sources that a Tesserae system knows about -- personal databases, relational databases, Web pages and more -- use ACL to link into the Tesserae Integration Engine (TIE), the core of the architecture. ACL has a shared vocabulary, a content language and a communication layer. By using the shared vocabulary, Tesserae can create standard expressions about content in its content language. It then translates these expressions into external communications that are specific to each entity it talks to.

The content language is the ANSI-standard Knowledge Interchange Format (KIF); the communication layer uses the Knowledge Query and Manipulation Language (KQML). Both KIF and KQML have roots in and are supported by the DARPA Knowledge Sharing Initiative.[1]

Inside TIE are a query planner, an inference engine, a metadata store, and two converters, one for data models and one for data terms. Information sources can connect and disconnect at runtime. TIE integrates legacy sources without altering them, but first someone has to configure them for TIE by entering descriptive information about the sources using a graphical interface. That information is stored in TIE as KIF statements. TIE is then responsible for understanding requests, processing them and routing or answering them.

It slices, it dices

With high-level knowledge about content and power tools to work on it, TIE can perform many functions, including answer white- and yellow-pages queries (where is source x? what sources can perform task y?); route messages based on their content; decompose complex queries (including managing the issuance and re-assembly of multiple sub-queries); translate requests phrased in non-standard terms; and notify participants of particular events or conditions.

To process these requests, TIE makes use of a variety of inference procedures, ranging from simple pattern matching to model elimination, an extension of the more familiar backward-chaining procedure. In fact, the inference procedure evaluates whether requests need translation, what information sources they should be routed to and so on.

The users' view of Tesserae is its Web Information Desk, with which they can identify sources and map their contents, then rapidly build applications that integrate information from various sources. There are other offerings on the market that unify various information sources, notably OnDisplay's CenterStage, Wall Data's Rumba and Salsa, and Business Objects' whole product line. Without a shared vocabulary and higher-level structures, they are page-layout tools to Tesserae's intelligent layout assistant. The key question remains whether the other companies' low-and-slow approaches will survive eCo's higher-level tools. Time should quickly tell.

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[1] *The information that Tesserae collects and stores is semantically richer than that provided by the Interface Definition Language that CORBA objects use to communicate with each other. Tesserae collects semantic information about sources -- what questions they can answer, under what circumstances -- as well as other properties, such as how authoritative the source is and how fast its site is. In contrast, IDL defines only the number and types of arguments of an object.*

BUSINESSBOTS: TICKET AGENTS, TALENT AGENTS...

Of all the companies in the eCo constellation, BusinessBots may have the toughest job. Although the company isn't ready to disclose specifics yet, its strategy is to develop commercial environments based on multiple, interacting software agents. The trouble is that many of the technologies needed to make such complex environments work have been proven only in research projects, and some desirable technologies, such as speech recognition, are hardly ready for prime-time service.

That doesn't mean BusinessBots won't succeed, especially given the right time frame. The company's multifaceted founder, Moses Ma, has made a remarkable career of gnawing on tough problems (see box). (It also helps that he recruited Tuomas Sandholm, a leading researcher in multi-agent systems.) Ma sees software agents as inevitable elements of our digital future. "The market may take time to move here," he says, "but it will."

No rest state

Ma's activities have ranged from theoretical physics and Taoist meditation to screenwriting, AI development, re-engineering, game theory and one-to-one marketing. In 1989, he founded Velocity Games, the pioneering fast-action multiplayer-game developer that produced the Spectre tank game. If you're a fan of multi-player Doom and Quake, you owe some thanks to Velocity. The multiplayer game work made Ma especially interested in various unexplored aspects of virtual humans, though with an emphasis on business applications.

One aspect, how virtual characters are manifest in cyberspace and how they can preserve their identities across virtual worlds, led him to originate the ideas behind the Universal Avatars specification. Another aspect, how virtual characters interact, led him to work with Mitsubishi Electric Research Lab (MERL; see below). Ma and MERL co-authored the Open Community VRML multi-user specification proposal (for more on avatars, see **Release 1.0**, 5-96; for multi-player environments, see 6-94 and 7-94).

The third aspect is how artificial humans interact with real humans. This takes at least two forms. The first is the user interface that allows agents and humans to communicate; the second is the way that agents and humans who don't know each other interact in virtual worlds. If the BusinessBots team can devise compelling solutions to these puzzles, their bots may well become our representatives in cyberspace.

BusinessBots is developing core technology and patents covering multi-agent interactions. It wants to own that patent space. Its first patents cover the "optimization of automated negotiations and business processes in multi-agent systems."

BusinessBots should benefit greatly from the other eCo efforts. As Websites, applications and databases describe themselves more uniformly and with greater semantic richness, agents should have a much easier time doing their jobs. BusinessBots' developers aren't starting from scratch; they're building the system atop Concordia, a newly announced framework for mobile agents developed at Mitsubishi Electric ITA.

Ma believes that comparison-shopping and search agents barely tap software agents' potential. He envisions many other kinds, including agents that can act as brokers, form coalitions with other agents, mine data and host auctions. For example, agents with coalition-forming skills might detect that they are not the only agents that want a certain product and begin to lobby other agents to band together for a group discount. (One can envision the eventual formation of agent unions, then union-busting agents.)

Now, though, Ma wants to log some quick, visible successes for BusinessBots, so he has focused the company on three different projects that show the technology's breadth and should earn it some mindshare. Ma won't disclose details other than the projects' domains, which are financial services, intellectual property management for research and spam control. Each project involves a major business partner.

Thorny issues aplenty

Ma understands that the quality of BusinessBots' user interface will make or break the company. The conversation between an agent and its human client is extremely difficult to make useful and simple. Even if recognition or AI systems reach 80 percent interpretive accuracy, it's the other 20 percent that cause all the problems.

As with most software, exceptions cause the most headaches, a point that is important for many aspects of eCo. How do you arm bots with contingency plans for unexpected events? How do you communicate tradeoffs or negotiating options to them? Is it possible to build a measure of common sense into the agents, or should they just report back when they're in doubt?

The problems get more complex as they scale. Sandholm, BusinessBots' chief scientist, has developed proofs that demonstrate control over multi-agent interactions; he recently won a million-dollar NSF award to pursue such research topics. Other BusinessBots' research covers ways of handling concurrent requests, avoiding price wars and stabilizing markets.

Finally, there are emerging identity issues. As bots get smarter, how will humans know that an entity they are interacting with is a bot, not a person? Should they "wear" some kind of bell or beacon? What will the new ground rules be, and who will establish them? These are the kinds of issues for which BusinessBots can break new trails.

MITSUBISHI ELECTRIC'S CONCORDIA

Concordia is a Java-based platform for mobile agent applications. It was developed by Mitsubishi Electric's Horizon Systems Laboratory (HSL), which is not a part of the core eCo group, but is a key technology supplier to BusinessBots. HSL has just begun to make public information about Concordia, which is in final beta release now at about 35 customers. Reuven Koblick, the company's deputy director, expects rollout to be slow but expects to have between 100 and 200 licensees by the end of 1998, with even faster growth after that.[2]

In early 1996, HSL researchers were developing an intelligent cellular phone running both Magic Cap and Telescript. When, that April, HSL stopped work on the phone software, its developers decided to build their own platform, using Java. Their product, Concordia, offers communication facilities that get agents to run in foreign environments, much as Telescript was designed to do, though Concordia is less comprehensive than Telescript. Concordia, which includes a comprehensive security architecture and administration model, leaves the user interface to application developers.

How and why

Concordia is sophisticated, but it's not complicated to implement. Java applets enable Concordia agents to run in browsers. Adding the Concordia environment to a server requires adding some Java classes (soon to be beans) to the server's virtual machine. One class, the Lightweight Agent Transport library, includes methods that know how to send and receive agents; another helps them communicate with existing user applications. Concordia has its own directory service that agents query to find services that they need.

Concordia agents can modify their own itineraries, clone themselves, pass messages to each other, expire unused, detect unneeded duplicate agents, distribute work, reassemble the results, update applications and more. They can perform a synchronous "collaboration" in which all agents transmit info to the collaboration, then multicast it back out. BusinessBots is adding capabilities to Concordia that allow agents to rendezvous, interact and do more complicated negotiations.

Mobile agents can work for you while you're offline. Simple database triggers can, too, but agents can undertake more complex activities that involve multiple steps or sources. For example, agents can periodically check the status of large numbers of network devices or troops in the field by finding the entities, checking their status, consolidating the information and presenting it.

Agents also move decisions closer to data sources. Since they can live at server sites, they get information right away and can act on it, eliminating delays introduced by network latency and human or programmatic response time. Agents extend your fingertips so they rest directly on the many pulses around the Net.

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[2] *Mitsubishi Electric has three US R&D labs, all part of Mitsubishi Electric Information Technology Center America (MEITCA). Mitsubishi Electric Research Lab (MERL) in Cambridge, MA, does basic research on many fronts, including a multi-user virtual environment called Diamond Park that we covered in May, 1996. The Advanced TV Lab (ATL) in Somerset, NJ, is relatively self-explanatory. The Horizon Systems Laboratory in Waltham, MA, develops and integrates enterprise-scale software.*

LIMITS TO AUTOMATION?

The level of automation promised by agents working alone and in concert in a semantically rich environment opens all sorts of questions. Will agent-based notification and negotiation change the velocity of markets? What limits will automation hit? Transaction complexity? Agent interaction? If mischievous participants flood markets with hostile agents, how will the systems handle the intruders?

How will agents affect individuals' buying patterns? Some Websites report that people make larger average purchases on the Net than in person or on the phone. They have more time to think, configure and convince themselves they need the pricier peripherals. Other Web merchants report that people buy smaller-ticket items on the Net because they want to negotiate over the bigger ones. Cultural norms will likely factor heavily here. Automation is desirable, but people are still the killer app.

Wearable bots

What are the proper roles for software agents and humans? One boundary is obvious: the interface with which humans communicate with their agents. But how about an agent that a human can "step into" when negotiations get sticky or situations get complex? A bot could greet visitors requiring service, ask enough questions to know how to route the visitors, perhaps answer simple questions automatically but also be "worn" at a moment's notice by human operators to handle more difficult questions.

On a less esoteric note, business advantage often depends largely on human nature. Will companies want to eliminate the unfair advantages they have because they employ great negotiators? How can a software agent exert pressure on a supplier bot because the buyer represents such a huge revenue source? BusinessBots has ways for bots to join forces, but much of the behavior of complex multi-agent systems is still known only from simulations. The next few years should allow eCo system organizations to test some of these theories.

RESOURCES & PHONE NUMBERS

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All Websites follow the form www.companyname.com, unless otherwise noted.
Mitsubishi Electric HSL http://www.meitca.com/HSL/

Further reading:

Eco System: An Internet Commerce Architecture, by Jay M. Tenenbaum, Tripatinder S. Chowdhry and Kevin Hughes; *IEEE Computer*, May 1997.

COMING SOON

- *Handling the info-flood.*
- *Identity management.*
- *Online governance.*
- *Market-based security.*
- *And much more... (If you know of any good examples of the categories listed above, please let us know.)*

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Oct 24-26	***The Camden Conference on Telecommunications: Reshaping American Communities** - Camden, ME. Organized by Bob Metcalfe and John Sculley. With Esther Dyson, George Gilder, Ted Leonsis and Ira Magaziner. Call Tom DeMarco, (800) 673-4855 or (207) 230-6211; fax, (207) 230-6211; info@camcon.org.
Oct 30-31	**Cybercrime** - Washington, DC. Sponsored by Oceana Publications. From money laundering to cracking smart cards and information warfare. Call (800) 831-0758 or (914) 693-8100; fax, (914) 693-0402; www.oceanalaw.com.
Nov 3-4	**Musicom 3** - Beverly Hills, CA. Organized by World Research Group. What's new media doing to the music industry? Call (800) 647-7600 or (212) 869-7231; fax, (212) 869-7311; info@worldrg.com; www.worldrg.com.
Nov 5-7	**CyberRisk '97** - Orlando, FL. Organized by National Computer Security Association. Explore Internet liability issues and possible solutions. Call (717) 241-3207; fax, (717) 243-8642; www.ncsa.com/events/conferences/registration.html.
Nov 8-14	**ACM Multimedia '97** - Seattle. Sponsored by ACM. Make multimedia hum, from interactive documents to virtual realities. E-mail Wayne Citrin, citrin@cs.colorado.edu; www.acm.org/sigmm/MM97.
Nov 9-12	**Strategic Solutions '97** - Rancho Mirage, CA. Sponsored by CommerceNet and ITAA. If this month's newsletter interested you.... With Ira Magaziner and Microsoft's Bob Herbold. Call Corinne Moore, (415) 858-1930 x202; fax, (415) 858-1936; moore@commerce.net; www.commerce.net.
Nov 9-14	**XPLOR (18th annual)** - Dallas. Sponsored by Xplor International. With AIIM, the big annual electronic document management conference. Call (310) 373-3633; fax, (310) 375-4240; www.xplor.org//conf/18global.html.
Nov 12-14	***Interactive Publishing Europe** - Zurich. Sponsored by Catchup! Communications. With Esther Dyson. Call Norbert Specker, 41 (1) 387-7088; fax 41 (1) 387-7080; catchup@dial-switch.ch; www.Interactive Publishing.ch.
Nov 13-15	**Fifth Annual Bionomics Conference: Now What? Living With Perpetual Evolution** - San Francisco. Organized by Cato Institute and Bionomics Institute. With sci-fi writer Gregory Benford, Peter Huber, George Dyson, retired NYC teacher John Taylor Gatto and John Hagel. Call (202) 218-4633; fax (202) 842-3490; bionom@cato.org; www.cato.org/events/bionomics.html.
Nov 13-16	**Jambalaya! The Design of Culture Meets the Culture of Design** - New Orleans. Organized by American Institute of Graphic Arts. Sounds (and smells) like fun! With John Hockenberry,

	Andrei Codrescu and Sven Birkets. Call (212) 807-1990; fax (212) 807-1799; agianatl@aol.com; www.aiga.org/jambalaya/.
Dec 7-10	**Software Marketing Executive Forum** - Aspen, CO. Organized by Software Marketing Journal. With Tom Seibel, Frank Moss and others. Call Nadine Kawalek, (415) 546-5588 x115; fax, (415) 546-5589; nkawalek@softwaremarketing.com.
Dec 8-11	**GigaNet '97** - San Jose, CA. Organized by Technology Transfer Institute. Want T-1 to your home and OC-12 to your desk? Come see when it will happen. Call Andrew Everett, (800) 200-4884 or (310) 394-8305; www.tticom.com/gignet.
Dec 8-12	***Internet World '97** - New York City. Organized by Meckler-Media. The PC Expo of the Internet, without the summer heat. With Steve Case, Alan Baratz and Michael Dell (now an Internet retailing expert). Call (888) 746-9737; fax, (203) 254-8169; bookit@mecklermedia.com; www.internet.com.

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January 12-16	**RSA '98** - San Francisco, CA. Sponsored by RSA Data Security. Crypto heaven. Call (415) 595-8782; fax (415) 595-1873; www.rsa.com.
February 1-4	**Demo '98** - Palm Springs, CA. Organized by Infoworld. Chris Shipley debuts her favorite startups. Call (800) 633-4312; fax, (650) 286-2750; conference_registrar@infoworld.com; www.demo.com.
February 3-4	**VirComm: The Management Strategy Conference on Business-Based Virtual Communities** - Orlando, FL. Organized by Online, Inc. Hagel and Armstrong's book stimulates a conference. Call Nancy Garman, (606) 331-6345; ngarman@well.com; www.onlineinc.com/vircomm.
February 4-7	**Interactive Newspapers '98** - Seattle, WA. Sponsored by Editor & Publisher. Call Michael Troxler, (212) 675-4380 x285; michaelt@mediainfo.com; www.mediainfo.com.
February 7-11	**Milia '98** - Cannes, France. Sponsored by Reed Midem. Content in Cannes. Call Diana Butler, (212) 689-4220; dianab@compuserve.com; www.milia.com.
February 18-20	***CFP '98 (Computers, Freedom and Privacy)** - Austin, TX. Hosted by the ACM and the University of Texas. Send inquiries and suggestions for conference content to Mark Lemley, mlemley@mail.law.utexas.edu; www.cfp.org.
March 22-25	****PC (Platforms for Communication) Forum** - Tucson, AZ. Sponsored by us. You read the newsletter; now meet the players. Call Forum Director Daphne Kis, (212) 924-8800; fax (212) 924-0240; daphne@edventure.com; www.edventure.com.
May 10-13	**Autonomous Agents (Agents '98)** - Minneapolis/St. Paul, MN. Sponsored by AAAI. Have your bot attend in your place. Visit www.cis.udel.edu/ agents98/ for all details.

** Events Esther plans to attend.*
@ Events Jerry plans to attend.

Lack of a symbol is no indication of lack of merit.
The full, current calendar is available on our Website (www.edventure.com).
Please let us know about other events we should include. -- Robyn Sturm

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Daphne Kis
Publisher

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